

CLAIMS:

1           1.       A clock selection device adapted to select one of a pair of clock sources  
2 onto an output clock line, comprising:

3                   a first input clock line coupled to a first clock source;

4                   a second input clock line coupled to a second clock source, the second  
5 clock source asynchronous to the first clock source; and

6                   a clock selection logic adapted to select from the first input clock line and  
7 the second input clock line, producing an internal clock line coupled to the output  
8 clock line.

1           2.       The clock selection device of claim 1, the first clock source having a first  
2 frequency and the second clock source having a second frequency, the second frequency  
3 independent of the first frequency.

1           3.       The clock selection device of claim 1, further comprising:

2                   a clock synchronization logic coupled to the first input clock line, the  
3 second input clock line, and the clock selection logic, adapted to synchronize the  
4 first input clock line, the second input clock line, and the clock selection logic,  
5 such that the internal clock line is glitch free.

1           4.       The clock selection device of claim 3, the clock synchronization logic  
2 comprising:

3                   a first clock synchronization block, coupled to the first clock source,  
4 adapted to synchronize the first clock source and the clock selection logic; and

5                   a second clock synchronization block, coupled to the second clock source,  
6 adapted to synchronize the second clock source and the clock selection logic.

1           5.       The clock selection device of claim 4, the clock synchronization logic  
2 further comprising:

3                   a first clock reset signal, synchronized to the first clock signal, adapted to  
4 reset the first clock synchronization block; and

5                   a second clock reset signal, synchronized to the second clock signal,  
6 adapted to reset the second clock synchronization block,

7                    wherein the first clock reset signal and the second clock reset signal can be  
8                    asserted to prevent meta-stability of the clock synchronization logic.

1            6.        The clock selection device of claim 3, wherein the clock synchronization  
2                    logic is scalable to produce a predetermined delay time between the assertion of the clock  
3                    select signal and the selection onto the output line by the clock selection logic.

1            7.        The clock selection device of claim 1, wherein the clock selection logic  
2                    comprises a multiplexer with two clock input lines.

1            8.        The clock selection device of claim 7, wherein the multiplexer switches  
2                    only when both clock input lines of the multiplexer are at the same assertion level.

1            9.        The clock selection device of claim 1, further comprising:  
2                    a clock selection signal, asynchronous to the first clock source and the  
3                    second clock source, adapted to cause the clock selection logic to select one of the  
4                    first input clock source and the second input clock source onto the internal clock  
5                    line, selecting the first input clock source when the clock selection signal is  
6                    asserted and the second input clock source when the clock selection signal is  
7                    deasserted.

1            10.       The clock selection device of claim 3, the clock synchronization logic  
2                    comprising:

3                    an OR gate coupled to a clock select line and an internal feedback line of  
4                    the clock synchronization logic;

5                    a first plurality of flip-flops coupled to the output of the OR gate and the  
6                    second input clock line, producing a clock switch line adapted to cause the clock  
7                    selection logic to switch between the first clock source and the second clock  
8                    source;

9                    an AND gate coupled to the clock select line and the clock switch line; and

10                  a second plurality of flip-flops coupled to the output of the AND gate and  
11                  the first input clock line, the output of the second plurality of flip-flops coupled to  
12                  the internal feedback line.

1           11.    The clock selection device of claim 10, the clock selection logic  
2 comprising:  
3                   an AND gate coupled to the internal feedback line and the first input clock  
4 line.

1           12.    The clock selection device of claim 10, the clock synchronization logic  
2 further comprising:  
3                   an inverter coupled to the first input clock line producing an inverted first  
4 input clock line coupled to the first plurality of flip-flops; and  
5                   an inverter coupled to the second input clock line producing an inverted  
6 second input clock line coupled to the second plurality of flip-flops; and  
7 the clock selection logic comprising:  
8                   a NAND gate coupled to the internal feedback line and the inverted first  
9 input clock line.

1           13.    The clock selection device of claim 1, further comprising:  
2                   a buffer coupled to the internal clock line, producing a buffered output  
3 clock signal.

1           14.    A processor-based device comprising:  
2                   a processor;  
3                   a plurality of communication controllers coupled to the processor, each of  
4 the plurality of communication controllers comprising:  
5                   a first clock source;  
6                   a second clock source asynchronous to the first clock source; and  
7                   a clock selection device coupled to the first clock source and the  
8 second clock source comprising:  
9                   a first input clock line coupled to the first clock source;  
10                  a second input clock line coupled to the second clock  
11 source; and  
12                  a clock selection logic adapted to select from the first input  
13 clock line and the second input clock line, producing an internal  
14 clock line.

1           15.     The clock selection device of claim 14, the first clock source having a first  
2 frequency and the second clock source having a second frequency, the second frequency  
3 independent of the first frequency.

1           16.     The processor-based device of claim 14, the clock selection device further  
2 comprising:

3                 a clock synchronization logic coupled to the first input clock line, the  
4 second input clock line, and the clock selection logic, adapted to synchronize the  
5 first input clock line, the second input clock line, and the clock selection logic,  
6 such that the internal clock line is glitch free.

1           17.     The processor-based device of claim 16, the clock synchronization logic  
2 comprising:

3                 a first clock synchronization block, coupled to the first clock source,  
4 adapted to synchronize the first clock source and the clock selection logic;

5                 a second clock synchronization block, coupled to the second clock source,  
6 adapted to synchronize the second clock source and the clock selection logic.

1           18.     The processor-based device of claim 17, the clock synchronization logic  
2 further comprising:

3                 a first clock reset signal, synchronized to the first clock signal, adapted to  
4 reset the first clock synchronization block; and

5                 a second clock reset signal, synchronized to the second clock signal,  
6 adapted to reset the second clock synchronization block,

7                 wherein the first clock reset signal and the second clock reset signal can be  
8 asserted to prevent meta-stability of the clock synchronization logic.

1           19.     The processor-based device of claim 16, wherein the clock  
2 synchronization logic is scalable to produce a predetermined delay time between the  
3 assertion of the clock select signal and the selection onto the output line by the clock  
4 selection logic.

1           20.     The processor-based device of claim 14, wherein the clock selection logic  
2 comprises a multiplexer with two input lines.

1           21.     The processor-based device of claim 20, wherein the multiplexer switches  
2     only when both input lines of the multiplexer are at the same assertion level.

1           22.     The processor-based device of claim 14, the clock selection device further  
2     comprising:

3                 a clock selection signal, asynchronous to the first clock source and the  
4                 second clock source, adapted to cause the clock selection logic to select one of the  
5                 first input clock source and the second input clock source onto the internal clock  
6                 line, selecting the first input clock source when the clock selection signal is  
7                 asserted and the second input clock source when the clock selection signal is  
8                 unasserted.

1           23.     The processor-based device of claim 22, the clock selection device further  
2     comprising:

3                 a clock synchronization logic coupled to the first input clock line, the  
4                 second input clock line, and the clock selection logic, adapted to synchronize the  
5                 first input clock line, the second input clock line, and the clock selection logic,  
6                 such that the internal clock line is glitch free.

1           24.     The processor-based device of claim 23, the clock synchronization logic  
2     comprising:

3                 an OR gate coupled to a clock select line and an internal feedback line of  
4                 the clock synchronization logic;

5                 a first plurality of flip-flops coupled to the output of the OR gate and the  
6                 second input clock line, producing a clock switch line adapted to cause the clock  
7                 selection logic to switch between the first clock source and the second clock  
8                 source;

9                 an AND gate coupled to the clock select line and the clock switch line; and

10                a second plurality of flip-flops coupled to the output of the AND gate and  
11                the first input clock line, the output of the second plurality of flip-flops coupled to  
12                the internal feedback line.

1           25.    The processor-based device of claim 24, the clock selection logic  
2 comprising:  
3                   an AND gate coupled to the internal feedback line and the first input clock  
4 line.

1           26.    The processor-based device of claim 24, the clock synchronization logic  
2 further comprising:  
3                   an inverter coupled to the first input clock line producing an inverted first  
4 input clock line coupled to the first plurality of flip-flops; and  
5                   an inverter coupled to the second input clock line producing an inverted  
6 second input clock line coupled to the second plurality of flip-flops; and  
7 the clock selection logic comprising:  
8                   a NAND gate coupled to the internal feedback line and the inverted first  
9 input clock line.

1           27.    The processor-based device of claim 14, the clock selection device further  
2 comprising:  
3                   a buffer coupled to the internal clock line, producing a buffered output  
4 clock signal on the output clock line.

1           28.    A method of selecting one of a pair of clock sources onto a single output  
2 clock line, comprising the steps of:  
3                   (a)    receiving a first input clock signal from a first clock source;  
4                   (b)    receiving a second input clock signal from a second clock source,  
5 the second input clock signal asynchronous to the first input clock signal; and  
6                   (c)    connecting one of first clock signal or the second clock signal to an  
7 internal clock line coupled to the output clock line.

1           29.    The method of claim 28, the first clock source having a first frequency and  
2 the second clock source having a second frequency, the second frequency independent of  
3 the first frequency.

1           30.    The method of claim 28, further comprising the step of:  
2 buffering the internal clock line to generate the output clock line.

1 31. The method of claim 28, further comprising the steps of:  
2 synchronizing the first input clock signal, the second input clock signal,  
3 and step (c), such that the output clock line is glitch free.

1 32. The method of claim 31, the step of synchronizing comprising the step of:  
2 delaying step (c) for a predetermined amount of time.

1 33. The method of claim 31, the step of synchronizing comprising the steps of:  
2 resetting a synchronization logic with a first reset signal synchronous to  
3 the first clock signal; and  
4 resetting the synchronization logic with a second reset signal synchronous  
5 to the second clock signal.

1 34. The method of claim 28, step (c) comprising the steps of:  
2 (c1) receiving a clock select signal asynchronous to the first clock  
3 signal and the second clock signal; and  
4 (c2) connecting the first clock signal to the output clock line when the  
5 clock select signal is asserted;  
6 (c3) connecting the second clock signal to the output clock line when  
7 the clock select signal is deasserted;  
8 (c4) synchronizing the first input clock signal, the second input clock  
9 signal, and steps (c2) and (c3), such that the output clock line is glitch free.

1 35. A clock switching mechanism with guaranteed stability, comprising:  
2 a clock switching means for switching a clock source of a first clock  
3 source and a second clock source to an output clock line, the second clock source  
4 asynchronous to the first clock source; and  
5 a clock synchronization means coupled to the first and the second clock  
6 sources and the clock switching means, the clock synchronization means  
7 guaranteeing the output clock line is glitch free.

1 36. The clock switching mechanism of claim 35, the clock synchronization  
2 means comprising:

3 a first reset means synchronized to the first clock source for resetting the  
4 clock synchronization means; and  
5 a second reset means synchronized to the second clock source for resetting  
6 the clock synchronization means,  
7 wherein the first reset means and the second reset means can prevent meta-  
8 stability of the clock synchronization means.

1 37. The clock switching mechanism of claim 35, the first clock source having  
2 a first frequency and the second clock source having a second frequency, the second  
3 frequency independent of the first frequency.

1 38. The clock switching mechanism of claim 35, the clock synchronization  
2 means comprising:

3 a first synchronization means coupled to the first clock source for  
4 synchronizing the first clock source to the clock switching means;

5 a second synchronization means coupled to the second clock source for  
6 synchronizing the second clock source to the clock switching means;

7 a clock selection means coupled to the first synchronization means and the  
8 second synchronization means for causing the clock switching means to switch  
9 between the first clock source and the second clock source;

10 a first feedback means coupled to the clock selection means and the first  
11 synchronization means for synchronizing the second synchronization means and  
12 the clock selection means; and

13 a second feedback means coupled to the clock selection means and the  
14 second synchronization means for synchronizing the first synchronization means  
15 and the clock selection means.